

NEW SPECIES OF ECHEANDIA (LILIACEAE) FROM NUEVA GALICIA

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The following species are proposed to provide names for the *Flora Novo-Galiciana*. I thank the curators of the following herbaria for the opportunity to examine material from their collections: ARIZ, ASU, BM, DS, ENCB, F, GH, K, LL, MEXU, MICH, MO, NA, NY, TEX, U, UC, US, WIS.

Echeandia mcvaughii Cruden, sp. nov.—TYPE: MEXICO. Jalisco: Ruta 15, ca 4 km NE junction Ruta 80, ca 30 km SW Guadalajara, 1600 m, 11 Aug 1968, *Cruden 1502* (holotype: UC; isotypes: ENCB, F, GH, K, MEXU, MICH, MO, NY, TEX, US, WIS).

Radicitubera ab cormo 0.5–3 cm. Scapus glaber vel scaber, saepe scaber prope basin super glaber, 0.3–1.2 m altus. Folia basalia 5–10. Tepala alba, anguste elliptica. Filamenta clavata, squamosa. Antherae connatae, conus gracilis. Capsula subglobosa.

Root-tubers 0.5–3 cm from corm, 1.5–3 cm long. Scape glabrous to scabrous, frequently scabrous near the base and glabrous above, 0.3–1.2 m high. Basal leaves 5–10, narrowly ovate to narrowly obovate, frequently falcate, 10–40 cm long, 10–30 mm wide, (entire) denticulate to ciliate. Cauline leaves (0–) 1–4, reduced to bracts. Flowers white, opening in the afternoon. Tepals 10–17 mm long, inner 2–3 mm wide, outer 1.5–2 mm wide. Filaments clavate, scaled, 2.5–4 mm long. Anthers connate, 6–11 mm long, usually more than twice the length of the filaments, cone long and slender, not strongly tapered, diameter at insertion of filaments rarely twice that of the apex, (0.9–) 1.0–1.6 (–1.8) mm wide at insertion of filaments, (0.5–) 0.6–1.0 (–1.2) mm wide at apex. Capsules globose to subglobose, 4–7 mm long, 4–6 mm wide. In flower July–August. Chromosome number $n = 8$ (*Cruden 1502, 1676, 1823, 1872*).

REPRESENTATIVE SPECIMENS: MEXICO. Jalisco: Ruta 15, ca 24 km W Guadalajara, ca 1600 m, *Cruden 1872* (GH, K, MEXU, MO, UC); Ruta 80, just E Acatlán, 1450 m, *Cruden 1676* (ENCB, UC); ca 5 rd mi SW Santa Cruz de las Flores, 1550 m, *McVaugh 16300* (MICH). Nayarit: Ruta 15, ca 26 km NW Tepic, *Cruden 1051* (ENCB, F, GH, K, UC, US); Ruta 15, K157–158, ca 18.5 km NW Ixtlán del Río, ca 900 m, *Cruden 1823* (ASU, ENCB, F, GH, K, MEXU, MO, NY, TEX, UC, US); SW Santa María del Oro, *Gentry 11018* (LL, MEXU, MICH); nr Tetitlán, ca 15 km W Ahuacatlán, 900–1000 m, *Feddema 503* (MICH).

This species is found in tropical deciduous forest, oak woods, subtropical scrub, and grasslands between 750 and 1600 m in a narrow region from northwest of Tepic to southwest of Guadalajara. It is distinguished by the large, clustered tubers, relative broad, usually falcate leaves, and a slender anther cone that is usually more than twice the length of the scaled filaments.

This handsome, endemic species is named for Rogers McVaugh, student of the flora of Nueva Galicia.

Echeandia parvicapsulata Cruden, sp. nov.—TYPE: MEXICO. Jalisco: Ruta 80, at top of pass ca 5 km SW La Huerta, ca 500 m, 15 Sep 1971, *Cruden 1987* (holotype: UC; isotypes: ENCB, GH, K, MO).

Radicitubera ab cormo 2–5 cm. Scapus glaber, 25–89 cm altus. Folia basalia 4–8, angusta. Folia caulina 2–6. Tepala alba, anguste elliptica. Filamenta anguste cylindrica, glabra. Antherae connatae. Capsula globosa vel late oblonga, 2.5–4 mm longa.

Root-tubers 2–5 cm from corm, 1–2 cm long. Scape glabrous, (25–) 55–89 cm high. Basal leaves 4–8, narrowly obovate, (14–) 22–65 cm long, 6–13 (–15) mm wide, entire to short ciliate. Cauline leaves 2–6, reduced to bracts, lowest to 8.5 cm long in robust specimens. Flowers white, opening in late afternoon. Tepals 9–10 mm long, inner 1.2–2.5 mm wide, outer 1–1.5 mm wide. Filaments narrowly cylindric, glabrous, 3.5–4 mm long. Anthers connate, cone strongly tapered, 5.5–6.5 mm long. Ovaries 1.9–2.2 mm long. Capsules globose to broadly oblong, 2.5–4 mm long, 2.5–3.5 wide. In flower August–September. Chromosome number $n = 8$ (*Cruden 1987, 2062*).

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Jalisco: 3 mi S La Huerta, 500–550 m, *McVaugh 19812* (MICH); 11 mi N of bridge of Río Cihuatlán on road from Santiago, Colima to Durazno, Jal., 500–550 m, *McVaugh 15947* (MICH). Nayarit: Ruta 200, 46–47 km W Compostela, ca 300 m, (flowered in greenhouse Jul 1974), *Cruden 2062* (MEXU, UC); 1.5 mi W Mazatán, rd to Las Varas, ca 600 m, *Feddema 1130* (MICH).

This species is found between 300 and 600 m in oak woods. It might be confused with *E. parviflora*, which has scabrous stems, at least near the base, ciliate leaf margins, and is generally associated with tropical deciduous forest.

Echeandia coalcomanensis Cruden, sp. nov.—TYPE: MEXICO. Michoacán: Dist. Coalcomán, Pto. Zarzamora, 3 Aug 1939, *Hinton et al. 15034* (holotype: GH; isotypes: ARIZ, LL, NY–2 sheets, US).

Radicitubera juxta cormum. Scapus glaber, usque ad 82 cm altus. Folia basalia 3–5. Folium caulinum 1, nonbracteatum, folium basale simulans, si 2 nunc superius bracteatum. Tepala alba, anguste elliptica. Filamenta anguste clavata, squamata. Antherae connatae.

Root-tubers 0.5–1.5 cm from corm, 1–3 cm long. Scape glabrous, 59–82 cm high. Basal leaves 3–5, narrowly obovate, 35–45 cm long, 5–14 mm wide, serrulate to denticulate. Cauline leaves 1 (–2), quite long and similar to basal leaves, if 2 the upper bractlike. Flowers white, pendulous. Tepals 9–11 mm long, to 2 mm wide. Filaments narrowly clavate, scaled, 2.5–4.5 mm long. Anthers 5.5–8 mm long, ca twice the length of the filaments, cone strongly tapered, diameter 1.5–2.3 mm wide near the insertion of the filaments, 0.3–0.6 mm wide at apex. Ovaries 1–2 mm long. Fruits not seen.

In general aspect both *E. mexicana*, which has yellow flowers and broader tepals, and *E. gentryi*, which has free anthers, resemble this species.

Echeandia sinaloensis Cruden, sp. nov.—TYPE: MEXICO. Sinaloa: Mazatlán, Jul 1934, *Ortega 7277* (holotype: UC; isotypes: F, K, US).

Radicitubera ab cormo 1–2.5 cm. Scapus scaber, 15–50 cm altus. Folia basalia 6–14. Folia caulina 1–2. Tepala alba, anguste elliptica. Filamenta anguste cylindrica, glabra. Antherae connatae, filamentis 2–3plo longiores. Capsula globosa, parva.

Root-tubers 1–2.5 cm from corm, ca 1 cm long. Scape scabrous, 15–50 cm high. Basal leaves 6–14, narrowly obovate, 5–25 cm long, 2–8 mm wide, entire to denticulate. Cauline leaves 1–2, reduced to bracts. Flowers white. Tepals 8.5–10 mm long, 1–2 mm wide. Filaments narrowly cylindric, glabrous, sometimes twisted and appearing scaled, 1.5–2.5 cm long. Anthers connate, 4–6.5 mm long, 2 or more times the length of the filaments, diameter of cone at insertion of filaments more than twice that of apex. Ovaries 1–1.5 mm long. Capsules globose, 3.5–4 mm long. In flower July–August.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Jalisco: 65 km NW Chamela, 11 km N rd to Tomatlán, *Pérez* 745 (MEXU). Sinaloa: *Ortega* 6347 (DS, GH, US); N Mazatlán, 5–20 m, *Pennell* 19742 (US); between Rosaria and Colomos, *Rose* 1622 (US); San Ignacio, *Ortega* 4034 (MEXU).

This diminutive species is found in lowland tropical forests. The numerous leaves, small flowers with long anthers, scabrous scape, and tiny root-tubers are distinctive.

Echeandia pihuamensis Cruden, sp. nov.—TYPE: MEXICO. Jalisco: Ruta 110, ca K178, ca 10.5 km SW Pihuamo, roadside with *Mimosa*, *Oxalis*, ca 725 m, 2 Jul 1968, *Cruden* 1330 (holotype: UC; isotypes: ENCB, F, GH, K, MEXU, MICH, MO, NY, US).

Radicitubera ab cormo 0.5–3 cm. Scapus glaber, 20–50 cm altus. Folia basalia 5–8. Folia caulina 0–1. Tepala alba, anguste elliptica. Filamenta anguste cylindrica, glabra. Antherae liberae, ab imo ad summum angustatae.

Root-tubers 0.5–3 cm from corm, 1–1.5 cm long. Scape glabrous, 20–50 cm high. Basal leaves 5–8, linear, 12–40 cm long, 4–10 mm wide, entire to denticulate. Cauline leaves 0–1, when present reduced to a bract. Tepals white, 6–8 mm long, 1–1.5 mm wide. Filaments narrowly cylindric, glabrous, 2.5–3 mm long. Anthers free, 2.5–3.5 mm long, bases flared, tapered from base to apex. Ovaries 1.5–2 mm long. In flower July. Chromosome number $n = 8$ (*Cruden* 1330).

Echeandia robusta Cruden, sp. nov.—TYPE: MEXICO. Jalisco: Ruta 80, ca K176, ca 15 km SW Autlán, steep bank and oak woods with *Calliandra*, *Cuphea*, *Commelina*, *Dahlia*, ca 970 m, 15 Sep 1971, *Cruden* 1990 (holotype: UC; isotypes: ENCB, GH, K, MEXU, MO).

Radicitubera ab cormo 1–3 cm. Scapus glaber, 1.1–1.8 m altus. Folia basalia 4–6, lata. Folia caulina alba, 7–11. Tepala alba. Filamenta anguste cylindrica, squamosa. Antherae liberae. Capsula oblonga.

Root-tubers 1–3 cm from corm, 1–2.5 cm long. Scape glabrous, 1.1–1.8 m high. Basal leaves 4–6, narrowly obovate, 38–75 cm long, 29–60 mm wide, entire. Cauline leaves 7–11, white, lowest to 43 cm long. Flowers white, opening in afternoon. Tepals narrowly elliptic, spreading, 11–15 mm long, inner 3.5–4.5 mm wide, outer 2.5–3.5 mm wide. Filaments narrowly cylindric, scaled, 5–6 mm long. Anthers free, dehiscing apically, 4.5–6 mm long. Capsules oblong, 11 mm long, 5 mm wide. In flower September–October. Chromosome number $n = 8$ (*Cruden* 1990).

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Jalisco: topotype, *McVaugh* 19890 (MICH). Michoacán: Dist. Coalcomán, *Aquila*, *Hinton et al.* 16162 (US).

This species is distinguished by its robust vegetative stature, broad basal leaves, many cauline leaves, tubers close to the corm, and anthers that dehisce through apical slits. The flowers resemble those of *E. echeandioides*, which are yellow and open in the morning.

Echeandia gentryi Cruden, sp. nov.—TYPE: MEXICO. Sinaloa: Ocurahui, Sierra Surotato, 6000–7000 ft, 1–10 Sep 1941, *Gentry 6254* (holotype: MICH; isotypes: ARIZ, GH, MO, NY).

Radicitubera juxta cormum. Scapus glaber, 30–61 cm altus. Folia basalia 3–8, angusta. Folia caulina 1–2. Tepala alba, anguste elliptica. Filamenta anguste cylindrica, squamosa. Antherae liberae.

Root-tubers next to the corm, 1–2 cm long. Scape glabrous, 30–61 cm high. Basal leaves 3–8, linear, 16–40 cm long, 0.5–6 mm wide, entire to short ciliate. Cauline leaves 1–2, reduced to bracts. Tepals white, 8–13 mm long, inner 2.5–5 mm wide, outer 1–2.5 mm wide. Filaments narrowly cylindric, scaled, 3.5–5.5 mm long. Anthers free, 2–4.5 mm long. Ovaries 1.8–2.5 mm long. In flower July–September.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Durango: 3 mi NE Otinapa, 2300–2400 m, *Maysilles 7329* (MICH). Nayarit: nr Cangrejo, ca 3 mi W Mesa del Nayar, *Norris & Taranto 14684* (MICH); ca 4 mi E La Ciénaga, ca 5 mi NW Mesa del Nayar, *Norris & Taranto 14244* (MICH).

This is a species of pine and pine-oak forests of middle elevations in the Sierra Madre Occidental. Its closest relatives are probably *E. coalcomanensis* and an undescribed species from Oaxaca.

Echeandia udipratensis Cruden, sp. nov. TYPE: MEXICO. Jalisco: Ruta 110, K43–44 [just N of Mazamitla], ca 4.5 km S Michoacán-Jalisco border, ca 2120 m, 2 July 1968, *Cruden 1329* (holotype: UC; isotypes: GH, K, MEXU, MO).

Radicitubera juxta cormum. Scapus glaber, 53–112 cm altus. Folia basalia 4–6, lata, ciliata. Folia caulina 2–3. Tepala flava, elliptica. Filamenta anguste clavata, squamata. Antherae liberae. Capsula oblonga.

Root-tubers close to corm, 3–5 cm long. Stem glabrous, 53–73 cm long in early flower, to 112 cm high in fruit. Basal leaves 4–6, ciliate, narrowly obovate, 25–50 cm long, 18–28 mm wide. Cauline leaves 2–3, reduced to broad bracts which encircle the stem, lower 4–7.5 cm long. Tepals yellow, elliptical, 16–19 mm long, inner 8–10 mm wide, outer 4–7.5 mm wide. Filaments 8–9.5 mm long, narrowly clavate, strongly scaled. Anthers free, versatile, 3–4 mm long. Ovaries 3.5–5.4 mm long. Capsules oblong, 13–16 mm long, 5.5–6.5 mm wide. In flower July. Chromosome number $n = 40$ (*Cruden 1329*).

ADDITIONAL SPECIMEN EXAMINED: MEXICO. Jalisco: Sierra del Tigre, 2 mi NE Mazamitla, 2100 m, 23 Sep 1952, *McVaugh 13181* (MICH).

Both collection sites are described as wet, meadowlike areas in an area of pine forest. The combination of large flowers and capsules, clustered tubers, and broad ciliate leaves are distinctive.

Echeandia occidentalis Cruden, sp. nov.—TYPE: MEXICO. Nayarit: Ruta 15, K190–191, ca 39 km SE Tepic, ca 1250 m, 16 Sep 1971, *Cruden 1994* (holotype: UC; isotypes: GH, K, MEXU, US).

Radicitubera juxta cormum. Scapus glaber, 60–135 cm altus. Folia basalia (4–) 5–11. Folia caulina 2–7 (–11). Tepala flava, elliptica. Filamenta anguste cylindrica vel anguste clavata, squamosa. Antherae connatae.

Root-tubers close to the corm, 2–5 (–8) cm long. Scapes 60–135 cm high, glabrous. Basal leaves (4–) 5–11, narrowly ovate to narrowly obovate, attenuate, 29–80 cm long, 5–15 (–25) cm wide, entire, denticulate or serrulate. Cauline leaves 2–9 (–11), lower usually well-developed. Flowers yellow to yellow-orange, tepals (12–) 13–19 mm long. Filaments narrowly cylindric (narrowly clavate), scaled, (5–) 5.5–7 mm long. Anthers connate, (5–) 7–10 mm long, mostly 1.5–2 mm longer than filaments, in some populations greenish yellow and contrasting with the yellow-orange filaments, diameter of anther cone at insertion of filaments more than twice that of apex. Ovaries 2.5–4.5 mm long. Capsules 10–14 mm long, 3–4 mm wide. In flower mid-July–September (late October). Chromosome number $n = 8$ (*Cruden 1667, 1882, 1994*).

REPRESENTATIVE SPECIMENS: MEXICO. Jalisco: 16 km SW Pihuamo, ca 790 m, *Cruden 1667* (ENCB, GH, MO, UC); Ruta 80, K171–172, S Autlán, 1250 m, *Cruden 1882* (ENCB, NY, UC); Barranca de Colimilla, ca 4 mi NE Guadalajara, ca 4000 ft, *Gentry & Gilly 10908* (MICH). Michoacán: 21 km S Uruapan, ca 1210 m, *Cruden 1981* (F, K, UC, US). Nayarit: Acaponeta to Pedro Paulo, *Rose 1939* (GH, MICH, MO, NY, UC, US); Cerro San Juan, W Tepic, 1000 m, *Mexia 719* (GH, MICH, MO, NY, US); 9 mi N Compostela, 1000–1200 m, *McVaugh 16486* (MICH); 3.5 mi NW Ahuacatlán, S base Volcán Ceboruco, ca 1100 m, *Feddema 428* (MICH); Yxtlán to San Marcos, 1100 m, *Mexia 858* (BM, F, NA, US).

This species occurs between 850–1300 (–1650) m from Nayarit into western Michoacán, primarily in tropical deciduous forest and oak woods. It usually has more basal and cauline leaves than *E. mexicana*, a species of pine-oak forests at higher elevations.

Echeandia imbricata Cruden, sp. nov.—TYPE: MEXICO. Jalisco: Precipitous south-facing mountain sides, 4 mi NNE Talpa de Allende, oak forest zone, nr road-summit, 1450–1500 m, 12–13 Oct 1960, *McVaugh 20109* (holotype: MICH).

Radicitubera ab cormo 3–6 cm. Scapus glaber, 62–72 cm altus. Folia caulina 8–12, attenuata, imbricata, cinerascens. Tepala flava, elliptica. Filamenta anguste cylindrica, squamata. Antherae liberae.

Root-tubers 3–6 cm from corm, 2–3 cm long. Basal leaves 6–7, linear, \pm falcate, 27–33 cm long, 3–14 mm wide, denticulate-serrulate. Scape glabrous, 62–72 cm high. Cauline leaves 8–12, narrowly ovate, the lower overlapping, sometimes enclosing the scape. Flowers yellow. Tepals 14–16 mm long, 3–5-veined. Filaments narrowly cylindric, scaled, 8–8.5 mm long. Anthers 3–3.5 mm long, dehiscing laterally. Ovaries 2.5–3 mm long. In flower October–November.

ADDITIONAL SPECIMENS EXAMINED. MEXICO. Guerrero: Dist. Adama, Temisco, Cerro de la Guacamaya, 400 m, *Mexia 8840* (F, GH, MO, NY, U, US). Michoacán: Barranca Hondo, rd between Uruapan and Apatzingán, ca 1000 m, *Lape 28* (MICH).

The yellow flowers and long, overlapping cauline leaves distinguish this species from *E. tenuis*, which has white flowers and small, non-overlapping cauline leaves.